

## I CLAIM

1. An ion beam implanter comprising:

- a) an ion beam source for generating an ion beam moving along a beam line;
- b) an implantation chamber defining an interior region wherein a workpiece is

positioned to intersect the ion beam for ion implantation of an implantation surface of the  
5 workpiece by the ion beam; and

c) workpiece support structure coupled to the implantation chamber and supporting  
the workpiece, the workpiece support structure including:

1) a first rotation member rotatably coupled to the implantation chamber and  
including an opening extending through the rotation member and aligned with an opening in a  
10 wall of the implantation chamber;

2) a second rotation member rotatably coupled to the first rotation member  
and having an axis of rotation offset from an axis of rotation of the first rotation member, the  
second rotation member overlying the opening of the first rotation member;

3) a third member fixedly attached to the second rotation member, the third  
15 member including a rotatable drive supporting the workpiece, the rotatable drive being rotatable  
with respect the first and second rotation members, extending through the second rotation  
member and the opening of the first rotation member, the first rotation member, the second  
rotation member and the rotatable drive of the third rotation member rotating to move the  
workpiece along a path of travel for implantation of the implantation surface wherein a distance  
20 that the ion beam moves through the implantation chamber before striking the implantation  
surface of the workpiece is constant.

2. The ion beam implanter of claim 1 wherein an axis of rotation of the rotatable  
drive of the third member is aligned with the axis of rotation of the first rotation member

3. The ion beam implanter of claim 1 wherein the axis of rotation of the first rotation  
member is aligned with the workpiece implantation surface.

4. The ion beam implanter of claim 1 wherein the axis of rotation of the second rotation member is offset from the axis of rotation of the first rotation member by a distance of 250 to 300 mm.
5. The ion beam implanter of claim 1 wherein the axes of rotation of the first and second rotation members are perpendicular to a direction of the portion of the ion beam within the implantation chamber.
6. The ion beam implanter of claim 1 wherein the path of travel of the workpiece is a linear path of travel.
7. The ion beam implanter of claim 1 wherein the workpiece support structure further includes a workpiece support affixed to the rotatable drive of the third member extending inside the implantation chamber.
8. The ion beam implanter of claim 7 wherein the workpiece support structure further includes an electrostatic clamp for holding the workpiece during implantation, the electrostatic clamp being affixed to the workpiece support.
9. The ion beam implanter of claim 8 wherein the electrostatic clamp is rotatable with respect to the ion beam.
10. The ion beam implanter of claim 1 wherein the first rotation member is coupled to the implantation station by a bearing assembly.
11. The ion beam implanter of claim 1 wherein the second rotation member is coupled to the first rotation member by a bearing assembly.
12. The ion beam implanter of claim 1 wherein a vacuum is maintained between the

implantation chamber and the first rotation member by a circular vacuum seal.

13. The ion beam implanter of claim 1 wherein a vacuum is maintained between the first rotation member and the second rotation member by a circular vacuum seal.

14. The ion beam implanter of claim 7 wherein vacuum is maintained between the work support and the second rotation member by a vacuum seal.

15. An ion beam implanter comprising:

a) an ion beam source for generating an ion beam moving along a beam line;

b) an implantation chamber wherein a workpiece is positioned to intersect the ion beam for ion implantation of a surface of the workpiece by the ion beam; and

5 c) workpiece support structure coupled to the implantation chamber and supporting the workpiece, the workpiece support structure including:

1) a first rotation member rotatably coupled to the implantation chamber and having an opening through the member, the opening being aligned with an opening in a wall of the implantation chamber; and

10 2) a second rotation member rotatably coupled to the first rotation member and overlying the opening of the first rotation member; and

3) a drive mechanism fixedly coupled to the second rotation member and including a rotatable drive extending through the second rotation member and the opening of the first rotation member and supporting the workpiece within an interior region of the implantation chamber, the first and second rotation members and the rotatable drive of the drive mechanism rotation such that the workpiece implantation surface is implanted at a desired implantation angle and the workpiece moves along a path of travel coincident with the desired implantation angle and such that a focal length of the ion beam is constant.

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16. The ion beam implanter of claim 15 wherein an axis of rotation of the rotatable drive of the drive mechanism is aligned with the axis of rotation of the first rotation member

17. The ion beam implanter of claim 15 wherein the axis of rotation of the first rotation member is aligned with the workpiece implantation surface.
18. The ion beam implanter of claim 15 wherein the axis of rotation of the second rotation member is offset from the axis of rotation of the first rotation member by a distance of 250 to 300 mm.
19. The ion beam implanter of claim 15 wherein the axes of rotation of the first and second rotation members are perpendicular to a direction of the portion of the ion beam within the implantation chamber.
20. The ion beam implanter of claim 15 wherein the path of travel of the workpiece is a linear path of travel.
21. The ion beam implanter of claim 15 wherein the workpiece support structure further includes a workpiece support affixed to the rotatable drive of the drive mechanism extending inside the implantation chamber.
22. The ion beam implanter of claim 21 wherein the workpiece support structure further includes an electrostatic clamp for holding the workpiece during implantation, the electrostatic clamp being affixed to the workpiece support.
23. The ion beam implanter of claim 22 wherein the electrostatic clamp is rotatable with respect to the ion beam.
24. The ion beam implanter of claim 15 wherein the first rotation member is coupled to the implantation station by a bearing assembly.
25. The ion beam implanter of claim 15 wherein the second rotation member is

coupled to the first rotation member by a bearing assembly.

26. The ion beam implanter of claim 14 wherein a vacuum is maintained between the implantation chamber and the first rotation member by a circular vacuum seal.

27. The ion beam implanter of claim 14 wherein a vacuum is maintained between the first rotation member and the second rotation member by a circular vacuum seal.

28. The ion beam implanter of claim 20 wherein vacuum is maintained between the work support and the second rotation member by a vacuum seal.